CRITERION 733

FIRE PROTECTION SYSTEM IMPAIRMENT CONTROL PROGRAM

SIGNATURES

Julie Wood Criterion Author	7/29/02 Date	FWO-FIRE Group	665-8279 Phone Number
Jim Streit Group Leader	7/29/02 Date	FWO-FIRE Group	665-3628 Phone Number
David McIntosh Maintenance Engineering Team	7-26-02 Date	FWO-SEM Group	667-3616 Phone Number
Kurt Beckman Acting Group Leader	7/26/02 Date	FWO-SEM Group	667-9769 Phone Number
Facility Management Council Committee Chairperson	7/26/02 Date	FMC Group	5-4854 Phone Number

RECORD OF REVISIONS

Revision No.	Date	Description
0	07/12/02	Initial Issue. This revision reflects the conversion from a WordPerfect document into a Microsoft Word document and additional clarification on how to develop criteria. This revision includes: • The addition of a Table of Contents, • The use of basis statements in Sections 6, 7 and 9. • Revision to Section 9, "Required Documents," and further clarification in the use of references. • Changes to Section 4.0 to address O& M Criterion written by groups other than FWO-SEM. • Changes to Sections 3 and 6, Appendices A and B per comments of FMC subcommittee. • Changes to Section 4.0 to include AHJ.

TABLE OF CONTENTS

CRITERION 733

FIRE PROTECTION SYSTEM IMPAIRMENT CONTROL PROGRAM

1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for control of fire protection system impairments at LANL.

This document addresses the requirements of LIR 230-05-01(Ref 10.1), "Operations and Maintenance Manual" and the requirements of LIR 402-910-01.4, "LANL Fire Protection Program."

Implementation of this Criterion satisfies DOE Order 430.1A (Ref 10.2) for the subject equipment / system. DOE Order 430.1A (Ref 10.2)"Life Cycle Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 2, Sections A through C, which in part requires UC to "…maintain physical assets in a condition suitable for their intended purpose," and employ "preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition." Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

2.0 SCOPE

This Criterion addresses planned impairments to Fire Protection SSCs resulting from the installation, alteration, repair, relocation, replacement, addition to, and use or maintenance of fire protection systems. This Criterion also addresses unplanned impairments to Fire Protection SSCs. Fire Protection SSCs are defined in Section 3.0. This Criterion does not address specific corrective maintenance actions required to repair or replace impaired equipment.

Fire protection SSCs and related loss control systems shall be taken out of service only when necessary, under carefully controlled conditions, and only in accordance with this Criterion. Fire Protection SSCs shall be restored to service before the end of the same working day that the planned impairment is initiated, unless extenuating circumstances require a longer period. The Facility Manager (FM), or designee, and the LANL Fire Marshal, or designee, will determine immediate mitigating actions, fire watch requirements, limiting conditions for designated operations up to and including stopping identified hazardous operations and building evacuation until the impairment has been corrected.

FMs are responsible for establishing the appropriate priority for their work tickets to ensure that fire protection system impairments are repaired and returned to service in a timely manner.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

CAS	Central Alarm Station
CFR	Code of Federal Regulations
DOE	Department of Energy
ITM	Inspection, Testing, and Maintenance
LIG	Laboratory Implementing Guidance
LIR	Laboratory Implementing Requirement
LPR	Laboratory Performance Requirement
NFPA	National Fire Protection Association
O&M	Operations and Maintenance
PPE	Personal Protective Equipment
PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
SSS	Support Services Subcontractor
UC	University of California

3.2 Definitions

Fire Protections SSCs: Systems, Structures and Components associated with: Fire Suppression Systems (sprinklers including anti-freeze loops; halon; carbon dioxide; dry chemical; etc.); Fire Detection Systems (smoke; heat; flame; etc.); Fire Protection Water Supplies (storage tanks; valves; hydrants; fire pumps; etc.); Occupant Notification Appliances (any fire alarm system component such as a bell, horn, speaker, light, or test display providing audible, tactile, or visible outputs); designated fire doors and smoke control doors; designated fire and smoke dampers; fire barrier penetration seals; alarm transmission and receiving capability; and Facility Life Safety provisions (e.g., exit and exit ways separated from adjacent areas by fire-rated construction.

Impairment: A scheduled or non-scheduled event that renders a fire protection system incapable of performing its fire protection function. Routine inspection,

testing, and maintenance (ITM) activities are not considered impairments. Minor component inoperability that does not affect the system's performance of its fire protection function (i.e., detection, suppression, fire alarm indication) is not considered a system impairment. Refer to Appendix B for additional guidance on this determination.

Impairment Coordinator: A LANL Fire Protection Group member assigned to evaluate and approve requests for fire protection system impairments at the request of maintenance organizations, Facility Managers, or designees. Other functions and duties are as specified in Section 6.0.

Life Safety: As defined by NFPA Standard 101. NFPA 101, "…addresses those construction, protection, and occupancy features necessary to minimize danger to life from fire, including smoke, fumes, or panic." NFPA 101 also, "…establishes minimum criteria for the design of egress facilities so as to permit prompt escape of occupants from buildings or, where desirable, into safe areas within buildings."

Management Level Determination (ML1, ML2, ML3, ML4): A classification system for determining the degree of management control applied to facility work. See LIR 230-01-02 for definitions of each ML level.

Mitigating or Compensatory Action: Any unusual action taken during the period of fire protection system impairment, to provide an additional level of fire safety during the impairment. Mitigating actions may include a fire watch, establishment of a temporary water supply, establishment of temporary communications, or any other action deemed appropriate by the Fire Marshal's Office to counterbalance the temporary lack of a normally used fire protection system.

Notification Appliance: Any device approved by the LANL Fire Marshal, designed to provide audible and/or visual warning to building occupants in the event a fire alarm is initiated automatically or manually.

Utility Outage: A planned utility outage is a pre-arranged shutdown of a utility or system supplying a building or structure (fire protection, electrical, steam/condensate, water, natural gas, HVAC, etc.) where interruptions of processes or user operations have been addressed and all affected users have been notified. Refer to Criterion 301, Planned Utility Outages in the LANL Operations and Maintenance Manual (LIR 230-05-0).

4.0 RESPONSIBILITIES

4.1 FWO-Systems, Engineering and Maintenance (SEM)

4.1.1 FWO-SEM is responsible for the administrative content of this Criterion and monitoring the applicability and the implementation status of this Criteria and either assisting the organizations that are not applying or meeting the implementation expectations contained herein or elevating their concerns to the director(s).

Basis: LIR 301-00-01.11; Issuing and Managing Laboratory Operations Implementation Requirements and Guidance, Section 5.4, OIC Implementation Requirements.

4.1.2 FWO-SEM shall provide technical assistance to support implementation of this Criterion.

4.2 FWO-Fire Protection (FWO-FIRE)

4.2.1 FWO-FIRE is responsible for the technical content of this Criterion and monitoring the proper implementation across the Laboratory.

4.2.2 FWO-FIRE shall provide technical assistance to support implementation of this Criterion.

4.3 Facility Manager

4.3.1 Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

4.3.2 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.3.3 Responsible for initiating necessary paperwork to allow repair work to begin immediately (where deemed safe).

4.3.4 Responsible for actions as described in Section 6.1.1.2 of this Criterion.

4.4 Fire Protection Group Leader/Fire Marshal

4.4.1 Responsible for assigning a Fire Protection Impairment Coordinator.

4.4.2 Responsible for actions as described in Section 6.1.1.5 of this Criterion.

4.5 Authority Having Jurisdiction (AHJ) – Fire Marshal

4.5.1 The AHJ is responsible for providing a decision on a specific technical question regarding this criterion.

4.6 Support Services Subcontractor

4.6.1 Responsible for providing ITM of the fire protection SSCs addressed in this Criterion.

4.6.2 Responsible for actions as described in Section 6.1.1.3 of this Criterion.

4.7 LANL Worker

4.7.1 Responsible for actions as described in Section 6.1.1.1 of this Criterion.

4.8 Impairment Coordinator

4.8.1 Responsible for actions as described in Section 6.1.1.4 of this Criterion.

4.9 Security Systems Group (S-3)

4.9.1 Responsible for operability of the LANL BRASS system.

4.9.2 Responsible for assigning and dispatching technicians to troubleshoot problems with BRASS Concentrators upon determination of a COMMUNICATION failure.

4.10 Qwest

4.10.1 Responsible for ownership and operability of leased LANL telecomm circuits.

4.10.2 Responsible for assigning and dispatching of technicians to trouble-shoot leased LANL telecomm circuits upon determination of a COMMUNICATION failure.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. It is intended only to assist the user in the identification of hazards/precautions that may not be immediately obvious.

There are no unique precautions associated with this Criterion; however, personnel responsible for implementation of this Criterion must be cognizant of the extent of that responsibility and of the consequences of actions taken during an impairment.

The ultimate goal of this Criterion is to ensure an acceptable level of life safety and property protection during a scheduled or unscheduled impairment of a fire protection system or component in a LANL facility. Consultation with the LANL Fire Protection Group Leader (or designee) and his approval for alternate methods of protection are imperative.

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.).

Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances to these requirements shall be prepared and submitted to FWO-SEM in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section.

6.1 Operations Requirements

The following actions are required to meet LANL commitments to the DOE as described in LIR 402-910-01, "LANL Fire Protection Program."

6.1.1 Planned or Unplanned Impairment

6.1.1.1 LANL Worker

The worker shall notify the Fire Marshal or designee (5-3628 or 7-9045) and the appropriate Facility Manager (for phone and pager numbers see http://arania.lanl.gov/ifmpo/pdfs/facility_manager_list.pdf) immediately after discovering an impaired fire protection system. Notification of the Facility Manager shall not consist of a phone message during evening, weekend, or holiday hours.

6.1.1.2 Facility Manager

Upon being notified of an impaired fire protection system, the Facility Manager shall do the following:
Initiate corrective actions immediately to ensure prompt repair of the system. Refer to Appendix B to this Criterion for additional guidance. In most cases, impaired systems are to be worked immediately until the affected system has been repaired, tested, and returned to fully operable status.

For planned or unplanned impairment(s):

a) Establish appropriate compensatory actions (per guidance in Appendix B to this Criterion) in the affected area **if the impaired system will remain out of service for more than 4 hours.**

b) Ensure prompt notification of the Los Alamos Fire Department (call the Central Alarm Station at 7-7080) of the extent and expected duration of the impairment.

c) Notify the Impairment Coordinator (7-7838 or 7-9045) of actions planned/taken and the expected return to service of the impaired SSC. Notify as soon as possible prior to planned impairments. For unplanned impairments, notify immediately or on the morning of the first working day following discovery of the unplanned impairment to ensure that the building is safe to occupy. Modify compensatory measures if recommended by the Impairment Coordinator.

For an impairment affecting other FM's, contact the other affected FM's to confirm that they are aware of the impairment and corrective actions being taken.

Basis: DOE O 420.1, "Facility Safety", Section 4.2.1(2); NFPA 1 (Fire Prevention Code); NFPA 25 (Inspection, Testing and Maintenance of Water Based Fire Protection Systems); NFPA 72 (National Fire Alarm Code)

6.1.1.3 Support Services Subcontractor

Upon receipt of a work order to repair an impaired fire protection system, or upon recognition that planned work will require impairment of a fire protection system, Support Services Subcontractor (SSS) worker(s) shall:

Immediately notify all affected Facility Managers of any unplanned impairment(s).

Notify the affected Facility Manager(s) of a planned impairment at least 24 hours before implementing the planned impairment.

For a planned or unplanned impairment during normal working hours, notify the Impairment Coordinator (667-7838 or 667-9045) of the impairment. For an unplanned impairment after normal working hours or on holidays or weekends, leave a phone message notifying the Impairment Coordinator (667-7838 or 667-9045).

Initiate a three-part Impairment Tag (obtain from Impairment Coordinator or SSS; see sample tag in Appendix A).

Part 1 of the Impairment Tag shall be retained with the SSS work package.

Part 2 of the Impairment Tag shall be delivered to the Impairment Coordinator no later than 10:00 am on the next working day.

Part 3 of the Impairment Tag shall be hung on the impaired component/system.

SSS is responsible for requesting assistance from S-3 or Qwest as required to correct COMMUNICATION failures. (Reference Memorandum of Understanding regarding BRASS System Maintenance Provided by S-Division, dated 11/12/2001.)

Once component/system repair has been completed, post-maintenance testing shall be performed prior to returning the impaired system to fully "Operable" status. Testing shall consist of an operational test of the device or component and alarm transmission verification at the fire control panel and CAS. If post-maintenance testing is not successful, the SSS worker shall notify the Facility Manager or designee before initiating additional corrective action.

Following successful post-maintenance testing, SSS shall fully complete all sections of Part 3 of the Impairment Tag (specifically "Restored to Service" portion). Detailed information is required regarding corrective actions taken to return the system to operable status.

Part 3 of the Impairment Tag shall be returned to the Impairment Coordinator as soon as possible following return of the impaired SSC to service, to indicate that the impairment can be closed out.

SSS shall notify all affected Facility Managers and the Impairment Coordinator as soon as the impaired fire protection system has been returned to service.

SSS shall maintain and update daily an electronic log or database listing fire protection system impairments and actions taken. This information shall be provided to the affected Facility Manager(s) daily. [Occurrence Report ALO-LA-LANL-RADIOCHEM-2001-0002.]

6.1.1.4 Impairment Coordinator

Upon being notified of an impaired fire protection system, the Impairment Coordinator shall discuss with the Facility Manager the appropriate mitigating actions, if any, to be implemented during the system impairment. Mitigating actions

should be chosen based on the guidance in Appendix B of this Criterion. The Impairment Coordinator will also discuss prioritization of the repair work with the Facility Manager.

For an unplanned impairment, the Impairment Coordinator will evaluate the impairment to determine the cause of the impairment and will notify the Fire Marshal when systems remain impaired for longer than 8 hours.

The Impairment Coordinator shall retain Part 2 of the Impairment Tag until Part 3 of the Impairment Tag has been received.

The Impairment Coordinator shall ensure that the affected Facility Manager and the Fire Marshal are notified when a system impairment has been closed out. Close-out of a system impairment shall not occur before Part 3 of the Impairment Tag is returned to the Impairment Coordinator.

The Impairment Coordinator is responsible for maintaining impairment information including actions taken, to support trending of equipment impairment issues.

6.1.1.5 Fire Marshal

Upon being notified of a system impairment that has lasted longer than 8 hours, the Fire Marshal or representative shall:

Contact the Facility Manager (FM) to ensure that appropriate actions have been taken to ensure prompt repair of the impaired system.

Review the current mitigating actions defined by the Impairment Coordinator and Facility Manager, and determine if the current actions should be upgraded to more restrictive mitigating actions.

NOTE: The Fire Marshal has the authority to require that the affected building be evacuated until the impaired fire protection system has been returned to full service.

Publish a weekly list of on-going fire protection system impairments, and make it available to all Facility Managers and Division Directors (See link on LANL FWO-FIRE web site).

6.2 Maintenance Requirements

No requirements beyond those stated in Section 5.2, Limitations.

7.0 RECOMMENDATIONS AND GOOD PRACTICES

7.1 Operations Recommendations

No requirements beyond those stated in Section 5.2, Limitations.

7.2 Maintenance Recommendations

No requirements beyond those stated in Section 5.2, Limitations.

8.0 GUIDANCE

8.1 Operations Guidance

No implementing guidance available.

8.2 Maintenance Guidance

No implementing guidance available.

9.0 REQUIRED DOCUMENTATION

Maintenance history shall be maintained for all fire protection systems to include, as a minimum, the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	**ML 1**	**ML 2**	**ML 3**	**ML 4**
Maintenance Activities				
Repair / Adjustments	**X**	**X**	**X**	**X**
PM Activities				
Equipment Problems				
Failure Dates	**X**	**X**	**X**	**X**
Failure Root Cause	**X**	**X**	**X**	**X**
Inspection Results				
Inspection Date	**X**	**X**	**X**	**X**
SSC Condition				

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states; "Maintenance activities, equipment problems, and inspection and test results are documented."

10.0 REFERENCES

The following references, and associated revisions, were used in the development of this document.

10.1 LIR 230-05-01.0, Operation and Maintenance Manual.

10.2 DOE Order 420.1, Facility Safety, Section 4.2, "Fire Protection".

10.3 DOE O 430.1A, Attachment 2 "Contractor Requirements Document" (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.

10.4 DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.

10.5 LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.

10.6 LPR 230-07-00, Maintenance History, Performance Criteria [2].

10.7 LIR 402-910-01.4, LANL Fire Protection Program

10.8 National Fire Protection Association (NFPA) Codes and Standards

10.9 Occurrence Report ALO-LA-LANL-RADIOCHEM-2001-0002.

10.10 Memorandum of Understanding regarding BRASS System Maintenance Provided by S-Division, dated 11/12/2001

11.0 APPENDICES

Appendix A: Sample Fire Protection System Impairment Tag

Appendix B: Fire Protection Impairment Evaluation and Determination of Compensatory Actions

Appendix C: Fire Watch Requirements

Appendix D: Fire Protection Impairments Process Flow Chart

APPENDIX A
SAMPLE FIRE PROTECTION SYSTEM IMPAIRMENT TAG

☆U.S. GPO: 2001-674-953

No. 11500

FIRE PROTECTION SYSTEM OR COMPONENT OUT OF SERVICE

REMOVAL BY AUTHORIZED PERSONNEL ONLY
ATTACH TO SYSTEM OR COMPONENT OUT OF SERVICE

TECH AREA: _____ BLDG: _____ FLOOR: _____ WING: _____

FIRE PROTECTION WATER CONTROL VALVE NO: _____

HYDRANT NO: _____

SYSTEM NO: _____

ALARM INITIATING DEVICES: (CHECK ONE)

PS [ ], FS [ ], HD [ ], SD [ ], MPS [ ], PIV SWITCH [ ]

OS&Y SWITCH [ ], LOW AIR SWITCH [ ], ZONE CIRCUIT NO. [_____]

SPRINKLER SYSTEM [ ], AREA: _____

HALON SYSTEM [ ], CO2 SYSTEM [ ], FIRE DOOR [ ],

FIRE PUMP [ ], OTHER: _____

DESCRIPTION OF IMPAIRMENT:

_____

_____

_____

AUTHORIZED BY:

SYSTEM OR COMPONENT OUT OF SERVICE

DATE / / TIME : NAME

RESTORED TO SERVICE:

DATE / / TIME : SIGNATURE

WORK PERFORMED:

_____

_____

_____

POST OUTAGE TEST & VERIFICATION:

1. 2" SPRINKLER DRAIN TEST: STATIC _____ PSI, FLOW _____ PSI
2. ALARM INITIATING DEVICE TEST AND ALARM VERIFICATION
   BRASS NO. _____ ZONE _____
3. OTHER: _____

OBSERVERS (OR WITNESSES)

VERIFIED FOR SSS BY:

DATE ____/____/____ SIGNATURE _____

VERIFIED FOR LANL FIRE PROTECTION:

DATE ____/____/____ SIGNATURE _____

SSS COPY LANL FIRE PROTECTION Form .008 Rev. 5/01

APPENDIX B
FIRE PROTECTION SYSTEM TROUBLE EVALUATION, COMPENSATORY ACTION, AND FIRE WATCH REQUIREMENTS

This appendix was created to provide guidance to Facility Managers on how to address fire protection system impairments. Some system impairments will necessitate compensatory actions and possibly immediate repairs. Other system impairments that are of a less critical nature will not necessarily require compensatory actions. These conditions are defined in this attachment. It must be stressed that the following information does not address every fire protection system condition that may be encountered. When in doubt, it is recommended that the users of this appendix err on the side of safety and take extra precautions. Where additional guidance is needed, contact FWO-FIRE at 7-9045.

In ALL cases, contact the Central Alarm Station (CAS, 7-7080) if any portion of a fire alarm system or sprinkler system or gaseous suppression system is considered impaired or out of service. Request that this information be immediately relayed via CAS to the Los Alamos Fire Department.

In ALL cases, compensatory actions such as Fire Watches are not required until the system/component has been out of service for more than four hours.

Table of Contents:

A. FIRE ALARM SYSTEMS:

The functions of a fire alarm system include:
(1) Detecting a fire condition,
(2) Initiating any required actions that may be built into the system (such as closing doors, dampers, turning off ventilation systems, actuating suppression systems, etc.), following detection of a fire condition.
(3) Relaying fire alarm signals back to the Central Alarm Station (CAS) following detection of a fire condition.
(4) Activating local fire alarm notification devices (horns/strobes/etc.) for local evacuation of building occupants following detection of a fire condition.
(5) Relaying a system actuation signal back to CAS following actuation of an associated fire system.
(6) Monitoring the condition and integrity of associated system circuits and components (detectors, tamper switches, ac power, etc.) during normal (non-fire) conditions and indicating problems via a "Trouble" and/or "Supervisory" signal, and relaying those signals back to the CAS.

NOTE: When a fire alarm system cannot fulfill the above functions, it is IMPAIRED.

The following are examples of abnormal conditions that may be encountered in association with a fire alarm system. Compensatory actions and repair priority varies. Again, the following list does not address every possible condition that may be encountered. When in doubt, err on the side of safety and take extra precautions. For additional guidance, contact FWO-FIRE at 7-9045.

A.1 Fire alarm system outages are permitted under controlled conditions initiated through the Utility Outage Permit system (i.e., no Impairment tag required: compensatory actions are as defined by FWO-FIRE on the Outage Permit). Fire alarm system outages are authorized for various reasons; the following are the most common:

- Fire alarm system modification.
- Fire alarm system must be temporarily disabled to allow for a building modification.
- Testing of fire alarm system equipment.
- Replacement of fire detector or other system component.

A.2 TROUBLE INDICATION on the fire alarm panel. (Monitored faults or circuit problems within the panel and wiring to field devices.)
Suggested immediate action:

- Attempt to "Reset" the panel.
- Determine the cause of the trouble indication.

➢ IF it is determined that the trouble condition is the result of an internal fire control panel fault, THEN:

- Establish a fire watch with a 2-hour minimum frequency for the affected area(s) (or at the frequency established in the facility authorization basis document). The affected components should be considered IMPAIRED until the trouble indication is corrected.
- Personnel in an occupied building can serve as the Fire Watch if they are directed to call 911 if fire or smoke is detected in the facility. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.

NOTES:

1. If the BRASS circuit is in trouble, subsequent FACP "trouble" signals may also not be reported.
2. On smaller relay panels that report common alarm/trouble (several zones on the FACP = one zone at CAS), a trouble alarm may actually be a communication failure with CAS. This can only be verified by testing/verification

REPAIR PRIORITY: IMMEDIATE. This type of impairment should be addressed immediately since the fire control panel is not functioning and will not send a signal to CAS.

A.3. **SUPERVISORY ALARM** indication on the fire alarm panel. (Monitored fire suppression systems or equipment or maintenance features of related systems.) Suggested immediate action:

- Determine the cause of the supervisory trouble signal.

➢ IF it is determined that the supervisory signal was the result of a PIV or OS&Y monitor switch, THEN:

- Immediately ensure the PIV and OS&Y's involved are in the open position and locked or sealed. A fire watch is not required. If the problem cannot be corrected in a timely manner, weekly inspections must be performed to verify valve position. **REPAIR PRIORITY: NEXT WORKING DAY.**

➢ IF it is determined that the supervisory signal was the result of a dry pipe sprinkler system low air condition, THEN:

- Determine what caused the loss of supervisory air (or nitrogen) and initiate corrective actions.
- During freezing weather, close the water control valve to avoid tripping the valve and allowing water to enter the system. This course of action should only be taken AFTER determining the loss of air in the system was not caused by a sprinkler head fusing as a result of heat caused by a fire.

- If the dry pipe system control valve is closed, establish an hourly fire watch, for the area protected by the dry pipe system (or at the frequency established in the facility authorization basis document). Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.
  REPAIR PRIORITY: IMMEDIATE. This type of impairment should be addressed immediately since the suppression system has been isolated.

- If there is no danger of freezing, the dry pipe valve can be left in a tripped position (i.e., with water in the system piping) and no fire watch is required.
  REPAIR PRIORITY: NEXT WORKING DAY

- If the system is shut off and no other alarm systems exist in the area (ex, fire detection), occupants should be notified that automatic fire alarms are also IMPAIRED.

➢ IF it is determined that the supervisory signal was the result of a low air condition in a rate-of-rise deluge system, deluge pilot head operated system, rate-of-rise pre-action system or electrically activated pre-action system, THEN:

- Verify that the loss of air was not a result of a fire condition.
- If loss of supervisory air or nitrogen is not due to fire condition, then:
  1. Close the water control valve;
  2. Set a fire watch surveillance at 1-hour intervals for the area protected by the system involved (or the frequency established in the facility authorization basis document). Personnel in an occupied building can serve as a fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.

REPAIR PRIORITY: IMMEDIATE. This type of impairment should be repaired immediately since the suppression system has been isolated.

➢ IF it is determined a subpanel is the cause of the supervisory signal (ex. halon or other extinguishing agent), THEN:

- Determine the cause of the supervisory signal and initiate corrective actions.
- If the sub-panel is associated with a gaseous fire extinguishing system that protects an area also protected by a sprinkler system, and is fully operational, then a fire watch is not required.
- Otherwise, establish compensatory actions including a fire watch for the affected area at 1-hour surveillance intervals (or at the frequency established in the facility

authorization basis document). Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.

- Once a fire watch is established, it may be prudent to isolate the gaseous suppression system until the supervisory signal is repaired, to prevent inadvertent system actuation and release of the agent.

REPAIR PRIORITY: IMMEDIATE. This type of impairment should be repaired immediately since the operability of the suppression system is in question even if the system is not isolated.

➢ IF it is determined that the supervisory trouble signal is associated with a Key Lock Box, THEN:

- Verify that the Key Box is secure and has not been tampered with. Report any tampering to PTLA and building operations personnel immediately.
- Initiate corrective actions.

REPAIR PRIORITY: IMMEDIATE. This type of impairment is not an impairment of the fire protection system, but represents a weakness in facility security. Therefore, immediate repair is required.

➢ IF it is determined that the supervisory trouble signal is a result of a monitored low temperature condition within a building area (loss of heat in sprinkler valve house or heat tape monitoring), THEN:

- Determine what area is covered by the loss of heat.
- Initiate corrective actions (repair the heat source).
- Establish compensatory actions to provide an alternate heat source if possible. A fire watch would not be required if temporary heat is provided.

NOTE: The heat source should be checked at intervals that are dictated by the weather and location.

- If temporary heat cannot be provided, the control valve for the system should be isolated and the system should be drained to prevent freezing and breaking of system piping. This action will impair the sprinkler system. Establish a fire watch for the affected area at 1-hour surveillance intervals (or at a frequency prescribed by the facility's authorization basis document). Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.

REPAIR PRIORITY: NEXT WORKING DAY if temporary heat is provided.

Otherwise, IMMEDIATE. Without temporary heat, and in potentially freezing conditions, the suppression system is in danger of freezing, which will at least prevent the system from operating as designed, and at worst will break system piping, causing facility damage and requiring system repair. Therefore, immediate repair is required.

A.4. COMMUNICATION FAILURE indication at the panel: Alarm, trouble, and supervisory signals cannot be transmitted from fire control panel to Central Alarm Station.

- Suggested immediate actions:
  - Troubleshoot:
    - First, verify that the FACP is operating properly (JCNNM).
    - If FACP is operating properly, then call the S-3 "on-call" technician to check BRASS equipment, and to work with JCNNM to verify that BRASS and FACP equipment is working correctly.
    - If FACP and BRASS determined OK, then call QWEST personnel to troubleshoot their communications circuits.
  - Initiate immediate corrective action.
  - Compensatory Actions: Establish a fire watch at 2-hour surveillance intervals for the area protected by the panel (or at a frequency prescribed by the facility's authorization basis document). Fire watch duties shall include monitoring the panel for alarms and notifying the CAS if the fire control panel initiates a fire alarm.

NOTES:

1. This signal will only occur in microprocessor "smart" panels (Autocall, EST-2, EST 'QuickStart', Notifier AFC-600). The "communication failure" signal will only be apparent at the CAS, not at the FACP. The FACP might indicate some systems trouble or it might be in the "normal" condition.
2. Suppression and detection and alarm systems are still in service when this condition exists.

REPAIR PRIORITY: IMMEDIATE. This type of impairment should be repaired immediately since the alarm system is not capable of performing its function of early notification of fire or indication of suppression system actuation.

NOTE: A nuclear facility TSR takes precedence over the above.

B. FIRE SUPPRESSION SYSTEMS

B.1 Water-Based Suppression Systems

Water-based fire suppression systems are defined as any automatic or manually actuated system that is designed to apply water or foam (water + chemical) to a fire. This includes all types of wet pipe, dry pipe, pre-action, and deluge fire suppression systems, and can include systems that apply fire fighting foam to a fire.

The functions of a water-based suppression system include:
(1) Detecting a fire condition such as high ambient temperature.
(2) Applying water or foam (water + foam) to the fire.
(3) Providing an indication of system actuation (normally sent via a fire alarm panel to a central station to allow notification of the fire department).

Some water-based suppression systems will include a local control panel to accomplish actions necessary to apply water to the fire. These actions, such as opening a deluge valve, are also required functions of the suppression system. In order for function (2) to be accomplished, the suppression system must have a reliable water supply, with adequate pressure, flow, and quantity available to supply water to the protected area. Therefore these aspects of the suppression system are also required for the system to be considered OPERABLE.

When a water-based suppression system cannot fulfill the above general functions and conditions, it must be considered IMPAIRED.

The following are examples of some possible abnormal conditions that might be encountered in association with a water-based suppression system. For additional guidance, contact FWO-FIRE at 7-9045 during normal working hours.

a. **System Outages:** System outages are permitted under controlled conditions initiated through the Utility Outage Permit system (i.e., no Impairment tag is required: compensatory actions are as defined by FWO-FIRE on the Outage Permit). Sprinkler system outages are authorized for various reasons. The following most common conditions are:

- System modification due to building modification,
- Repair of damaged or leaking piping or sprinklers/nozzles,
- Repair of system components (flow switches, inspector test valves, fire department connection check valves and interior inspection or repair of alarm check valves),
- Testing back flow prevention devices,
- Repairing main drain valve, and
- Annual system alarm testing.

b. **System or Component Impairments:**

1. When unsatisfactory conditions associated with components of a water-based suppression system are discovered, the suppression system is not considered IMPAIRED UNLESS the following conditions exist:
   (a) 10 % or more of the system sprinklers/nozzles, pilot heads, or detectors (ex. for deluge or preaction systems) in a 1500 square foot area protected by the same system are incapable of detecting high ambient temperatures; or
   (b) 10% or more sprinklers or nozzles in a 1500 square foot area protected by the same system are incapable of applying water to a fire; or

(c) System actuation cannot be detected or an actuation signal cannot be transmitted via the fire alarm system back to the central alarm station (this condition will require compensatory actions as defined in Section A. Fire Alarm Systems, above).
(d) The water supply to the system is IMPAIRED, such that adequate water pressure/flow is NOT available to the sprinkler system.

NOTE: In the above cases, [(a), (b), (c), and (d)], a nuclear facility TSR takes precedence over the above restrictions.

2. IF conditions exist such that the affected system is IMPAIRED (as defined above), THEN:
   - Establish a fire watch with a 1-hour frequency for the affected area (or at a frequency prescribed by the facility's authorization basis document). Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.
   - Restrict hot work or other increased fire hazard activities in the affected area until the system can be repaired (unless such activities are required to repair the system).

   REPAIR PRIORITY: IMMEDIATE.

3. IF the a system outage is required for a condition that does not render the system IMPAIRED, as defined above, THEN no compensatory actions are required until the system outage is implemented (the system outage will render the system IMPAIRED).

   REPAIR PRIORITY: NEXT WORKING DAY.

- Outages must be planned to minimize system down time.
- Suggested compensatory actions during water-based suppression system outages:
  - Establish a fire watch with a 1 hour surveillance interval (or at a frequency prescribed by the facility's authorization basis document);
  - Prohibit welding and cutting and other increased fire hazard operations in the protected area while the sprinkler system is out of service (unless required to repair the system).
  - Personnel in an occupied building can serve as the Fire Watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.

c. **Water Supply:** Water supply system impairments prevent the underground water supply piping from providing the design pressure and gallons per minute required at the base of the fire protection riser.

Suggested compensatory measures to provide an alternate water supply to the water-based suppression system affected by an underground water supply outage include the following:

- Run a 2 ½" hose from an operable fire hydrant to the fire department connection or the 2" sprinkler main drain for a suppression system whose normal underground water supply is IMPAIRED. If freezing is a concern, the hose(s) should be connected, but the hydrant may be left in the closed position and the fire watch should be instructed to open it in the event of a fire.
- Where an alternate water supply cannot be provided, the affected suppression system(s) must be considered IMPAIRED, and compensatory actions described in B-1.b above must be instituted.

Water flow alarm considerations:

The temporary water supply described above will by-pass the pressure switch (normal indicator of riser water flow) on the suppression system riser. Water flow indication is required, and must be considered if this compensatory action is used. Options include the following:

- If there are flow switches downstream of the temporary water supply connection, they will operate normally to indicate system actuation.
- If there are no flow switches mounted downstream of the temporary connection, a flow switch mounted in the temporary water supply hose may be used to provide a flow alarm. The flow switch mounted in the hose should be located near the riser, regardless of where the connection is made (FD connection or 2" drain). The alarm tie-in for the flow switch alarm is also required, but is expected to be a minor part of the job.
- Description of the flow switch mounting device: A piece of pipe approximately 18 inches long with a male and female hose thread on either end, with an appropriate female thread fitting installed in the middle of the pipe section to receive the flow switch. A flow switch approved for fire service with NO/NC contacts should be used.

d. **Other Circumstances:** Other circumstances, such as a major modification to a building that is protected by an automatic sprinkler system, may require innovative thinking to provide sprinkler protection to the facility while construction is occurring. For example, it may be necessary to place a portion of the sprinkler system out of service during construction activities, review the piping main, branch lines etc. If the section of the sprinkler system to be worked on can be isolated from the rest of the system (ex. by removing a section of piping and plugging the remaining piping), then a portion of the sprinkler system can be placed back into service while the remainder of the system is worked on. This will allow continued protection for the area not under construction. For this sort of planned activity, consult FWO-FIRE.

B.2 Gaseous Fire Suppression Systems

Gaseous fire suppressions at LANL are generally limited to halon and halon-alternative fire suppression systems. A gaseous fire suppression system will:

(1) Detect a fire condition (smoke, heat, or flame) via a fire detector.
(2) Initiate any necessary automatic actions prior to releasing gaseous fire suppressant into the fire area (such as isolating ventilation systems, automatically closing doors and dampers to ensure that the protected room is relatively leak-proof, etc.)
(3) Release the required quantity of gaseous fire suppressant into the protected area. (The quantity of gaseous agent will vary depending on the configuration of the protected room.)
(4) Maintain the required concentration of gaseous fire suppressant in the protected room for the required time period. (The concentration and soak time may vary depending on the specific agent used, the hazard protected, and the configuration of the room.)
(5) Relay an indication of system actuation to CAS.

When a gaseous fire suppression system cannot fulfill the above functions, it must be considered IMPAIRED.

The following list outlines considerations associated with gaseous fire suppression systems, including some abnormal conditions that may occur. However every possible condition is not addressed. When in doubt, err on the side of safety and take extra precautions. For additional guidance, contact FWO-FIRE at 7-9045.

(a) Impairments or system trouble(s) involving gaseous fire suppression systems must be evaluated IMMEDIATELY. This type of suppression system is installed in areas or buildings that are of high value or programmatically vital. With the exception of agent container weight, trouble analysis should follow the same steps and guidance provided in this document for fire alarm systems.
(b) A fire watch should be established immediately upon determining that the gaseous fire suppression system cannot perform its required functions (as defined above). The fire watch surveillance intervals must meet the minimum 1-hour surveillance requirement or more frequently as required in the facility's authorization basis document. Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if smoke or fire is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.
(c) Note that the inability of the protected room or space to remain relatively leak-proof also renders gaseous fire suppression system IMPAIRED. Therefore, unsealed penetrations or unclosed doors into a room protected with a gaseous fire suppressant will render the suppression system IMPAIRED, and must be sealed/closed before the system can be considered operable again.
(d) Note that some areas protected with gaseous fire suppression systems are also protected with sprinklers. In these cases, if the sprinklers protect the same physical space as the gaseous

system, a fire watch can be eliminated if the sprinkler system and all associated alarm capabilities are verified to be in working order.

B.3 Other Types of Fire Suppression

Other types of fire suppression systems employed at LANL include wet and dry chemical systems. The functions of these types of systems include:

- Detecting fire conditions (if automatically actuated)
- Initiating special actions prior to releasing fire suppressing agent (ex. ventilation shutdown, etc.)
- Releasing fire-suppressing agent in the affected area.

If any of the above functions cannot be fulfilled by the system, it must be considered **IMPAIRED**, and the following actions should be taken:

1. IF an operable sprinkler system protects the same area as the impaired other fire suppression system, THEN no compensatory actions are required.
REPAIR PRIORITY: NEXT WORKING DAY

2. IF there is no operable sprinkler system protecting the same area as the impaired other fire suppression system, THEN:
- Establish a Fire Watch with a 1-hour frequency for the affected area (or at a frequency prescribed by the facility's authorization basis document). Personnel in an occupied building can serve as the fire watch if they are directed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas.
- Restrict hot work or other increased fire hazard activities in the affected area until the system can be repaired (unless such activities are required to repair the system).

REPAIR PRIORITY: IMMEDIATE

C. HYDRANTS AND STANDPIPES

The function of a fire hydrant or standpipe includes the ability to provide a ready source of water at an adequate water pressure and flow, and with appropriate hardware (ex. hose connections) to enable firefighting personnel to manually fight a fire.

When the above conditions cannot be met, the affected hydrant or standpipe must be considered IMPAIRED.

The water supply associated with a fire hydrant or standpipe may include a water flow device such that a signal will be relayed to CAS upon use of the standpipe or hydrant. (Flow switches

are located on some system risers. Where a standpipe is supplied off of a riser equipped with a flow switch, use of the standpipe will actuate the flow switch. Where a facility's water supply system includes one or more diesel or electric fire pumps, use of a fire hydrant will result in actuation of a fire pump and subsequent alarm to CAS of fire pump operation.)

If a fire hydrant or standpipe must be considered IMPAIRED, no compensatory actions are required unless mandated by the facility's authorization basis document. Repair must be initiated the NEXT WORKING DAY unless a more immediate response is required by the facility's authorization basis document.

If a hydrant or standpipe must be considered IMPAIRED, notify the Los Alamos Fire Department immediately, since they may have preplanned to use the IMPAIRED equipment if required to fight a fire at the facility.

If the hydrant or standpipe will be IMPAIRED for more than 14 days, contact FWO-FIRE for guidance on appropriate compensatory actions.

A fire hydrant is sometimes used for non-fire fighting purposes (ex. filling up a tanker truck used to mitigate dust at a construction site). In such cases, it is necessary to get approval from FWO-FIRE and FWO-UI. No compensatory actions are typically necessary, although FWO-UI typically requires the use of a backflow preventer.

D. FIRE BARRIERS, FIRE DAMPERS, SMOKE DAMPERS, FIRE BARRIER PENETRATION SEALS, and FIRE DOORS

1. The functions of a FIRE BARRIER include the ability to:
   (a) Prevent or retard the spread of fire beyond the room or area of fire origin. This is both a Loss Prevention function and a Life Safety function. Fire barriers are typically used to separate areas of higher fire hazard from areas of lower fire hazard, or to separate large facilities into sections so that the consequences of a fire will be minimized.
   (b) Provide building occupants with a safe exit path from the building. This is a Life Safety function. Enclosed stairwells and floors/ceilings between building elevations should be considered to be fire barriers required for Life Safety.
   (c) Provide building occupants with an area of refuge within the building, such that they need not exit the building but will still be safe from fire in another part of the building. This is a Life Safety function. Enclosed stairwells in some buildings fulfill this function. Other areas of refuge are as defined by the building emergency exit plan.
   (d) Provide a relatively leak-proof boundary around a room protected by a gaseous fire suppressant agent such as Halon or FM-200. This is a Loss Prevention function. This function of a fire barrier is required to ensure that the appropriate fire suppressing concentration of the gaseous fire suppressant will be maintained in the protected room for the duration necessary to extinguish the fire.

When a fire barrier cannot fulfill the above functions and conditions, it must be considered IMPAIRED.

2. SUB-COMPONENTS of a FIRE BARRIER include fire doors, fire dampers, smoke dampers, and penetration seals. The fire protection function of these sub-components is primarily to maintain the fire protection function of the fire barrier in which they are installed. Following are additional functions of the sub-components of a fire barrier:

   a. FIRE DAMPERS are installed in ventilation ductwork where the ducts penetrate fire rated barriers (exceptions per NFPA 90A). The functions of fire dampers include the following:
      (1) Remaining in the open position during normal operation, so as not to adversely affect normal operation of the ventilation systems in which the dampers are installed.
      (2) Automatically closing when exposed to fire effects. (Fire damper actuation is typically by melting of a fusible link on the fire damper, resulting in automatic closure of the fire damper. Fire dampers must be able to successfully close under normal airflow.)
      (3) When in the closed position, preventing spread of flames, heat and significant hot gases through the ductwork, across the fire barriers in which the dampers are installed, so that fire spread from one side of a fire barrier to the other through the ductwork is prevented or retarded.
      (4) Fire dampers DO NOT prevent spread of smoke through ductwork.

      When a fire damper cannot fulfill the above functions and conditions, it is considered IMPAIRED.

   b. SMOKE DAMPERS are installed in HVAC ductwork to resist spread of smoke through the ducts during a fire in the facility. The functions of smoke dampers include the following:
      (1) Remaining in the open position during normal operation, so as not to adversely affect normal operation of the ventilation systems in which the dampers are installed.
      (2) Automatically closing when closure is initiated by a control system. A smoke damper is closed when a device on the damper is activated by an associated fire alarm system or by an associated smoke management system. (Damper closure devices can be electrothermal, electromagnetic, pneumatic, or hydraulic.) Smoke dampers must be able to successfully close under normal airflow, unless the actuating alarm or smoke management system also shuts down the ventilation system.
      (3) When in the closed position, preventing the spread of smoke through the ductwork.

      When a smoke damper cannot fulfill the above functions and conditions, it is considered IMPAIRED.

   c. FIRE-STOP SYSTEMS or PENETRATION SEALS are installed in fire-rated barriers that have been penetrated. A fire barrier penetration might have nothing running through

it, or it may have piping, cable trays, conduits, cables, etc., running through it. The functions of a penetration seal include the following:

(1) Remaining in place in the wall or floor during normal conditions and during and following a fire.
(2) Preventing spread of fire through the fire rated barrier penetration by preventing/retarding passage of flames, heat, hot gases, smoke through the penetration.

When a penetration seal cannot fulfill the above functions and conditions, it must be considered IMPAIRED.

d. FIRE DOORS are installed in fire rated barriers that must be equipped with openings that allow passage of people/equipment. The functions of a fire door include the following:
   (1) Returning to the closed and latched position when released from an open position, if the door is in the normally closed position.
   (2) Automatically closing and latching when fire conditions are present on either side of the doorway, if the door is normally in the open position. *The automatic actuation can occur when heat melts a fusible link on the door hardware, or it may occur when smoke actuates a smoke detection system adjacent to the doorway, which electrically releases magnetic switches that hold the door normally open.*
   (3) Preventing spread of significant flames, smoke, and hot gases from one side of the door to the other, thereby preventing or retarding spread of fire through the doorway to the non-fire side. *Approval tests of fire doors per Underwriters Laboratories and NFPA standards allow some minimal flaming through the gap at the bottom of the door. NFPA 80 specifies the maximum allowable gap at the bottom of the door. This allowance for minimal flaming on the non-fire side is based on the expectation that a personnel access doorway will be clear of combustible materials on either side of the door – minimal flames under the door are therefore not expected to propagate the fire to the non-fire side.*
   (4) Remaining in a closed position in the wall where installed during fire conditions on either side of the door. *NFPA 80 requires that the latch on a standard personnel fire door extend at least ½" and specified the maximum allowable gap between the edge of the door and the doorframe to ensure that the door will stay in the closed position during a fire.*

   When a fire door cannot fulfill the above functions and conditions, it must be considered IMPAIRED.

3. Possible abnormal circumstances and the appropriate actions to take if they occur are outlined below. However, every possible fire barrier condition that may occur is not addressed. When in doubt, err on the side of safety and take extra precautions. If additional guidance is needed, contact FWO-FIRE at 7-9045.

a. If a normally closed or open fire door cannot shut on its own, but once in the closed position will remain closed, and is otherwise unimpaired, no compensatory actions are required as long as the door is left in the closed position and some means is enforced to ensure that the door remains in the closed position unless in use (ex. a sign on both sides of the door stating that it must be returned to the fully closed and latched position following use, and a periodic visual check during normal working hours to verify position).
b. If a fire door must be propped open for longer than 4 hours, then the restrictions identified in Section E below apply.
c. It is acceptable for a fire door to have up to three small electrical cords temporarily running beneath it for up to 8 hours. This does not make the fire door IMPAIRED as long as the door is able to close and latch. If the duration must extend beyond 8 hours, then the door should be considered IMPAIRED and the restrictions identified in Section e below apply.
d. If a fire barrier or sub-component of a fire barrier associated with a gaseous fire suppression system is damaged or IMPAIRED such that the required concentration of gaseous fire suppressant cannot or might not be maintained in the protected room for the required duration, then the associated gaseous fire suppression system should be considered IMPAIRED. See the section above on gaseous fire suppression systems.
e. If fire doors, fire damper, smoke damper, or penetration seal is damaged or IMPAIRED such that it represents a breach in the fire barrier, compensatory actions may be required:
   (1) If the damaged/IMPAIRED component is located in a fire barrier that forms a stairwell, or if it is located in a floor/ceiling between elevations of a multi-story building, then the item must be repaired as soon as possible, since these barriers are Life Safety Barriers. Impairments to these barriers are considered Fire Protection System Impairments, and should be documented in accordance with this Impairment Criterion. If the damaged/IMPAIRED component cannot be repaired within 10 working days, then an hourly fire watch is required on both sides of the affected barrier until repair/replacement. If the damaged/IMPAIRED component can be repaired/replaced within 10 working days, then no additional actions are required.
   REPAIR PRIORITY: WITHIN 10 WORKING DAYS

   (2) If the damaged/IMPAIRED component is located in a fire barrier that separates a higher fire hazard from a lesser fire hazard, then the following applies:
      (a) If the area on either side of the affected fire barrier is protected by a sprinkler system, and that sprinkler system is operable, then no additional actions are required. Repair the damaged/IMPAIRED component as soon as possible. This type of impairment should be documented via the normal work control process to ensure that it is repaired in a timely manner.
      REPAIR PRIORITY: WITHIN 10 WORKING DAYS

      (b) If there is no sprinkler system on either side of the affected barrier, then repair the damaged/IMPAIRED component as soon as possible. If the damaged/IMPAIRED component is not repaired within 10 working days, then an

hourly fire watch is required on both sides of the barrier during non-normal work hours. Otherwise, no additional actions are required. This type of impairment should be documented via the normal work control process to ensure that it is repaired in a timely manner.
REPAIR PRIORITY: WITHIN 10 WORKING DAYS

(3) If the damaged/IMPAIRED component located in a fire barrier is credited by a Fire Hazards Analysis for separation within a building to maintain potential loss due to a fire at less than $1 million, then the following applies:

(a) If the area on either side of the affected fire barrier is protected by a sprinkler system, and that sprinkler system is operable, then no additional actions are required. This type of impairment should be documented via the normal work control process to ensure that it is repaired in a timely manner.
REPAIR PRIORITY: WITHIN 10 WORKING DAYS

(b) If there is no sprinkler system on either side of the fire barrier, then an hourly fire watch on both sides of the barrier is until the damaged/IMPAIRED component is repaired (or at the frequency established by the facility's authorization basis document). Personnel in an occupied building can serve as the Fire Watch if they are directed/instructed to call 911 if fire or smoke is detected. Note that unoccupied areas of an otherwise occupied building must be provided with a Fire Watch, since personnel in the rest of the building will be unable to detect a fire in the unoccupied areas. This type of impairment should be documented via the normal work control process to ensure that it is repaired in a timely manner.
REPAIR PRIORITY: WITHIN 10 WORKING DAYS

NOTE: A nuclear TSR takes precedence over the above.

E. FIRE PREVENTION MECHANISMS

Many LANL facilities employ fire prevention mechanisms as part of a Defense In Depth program of fire protection. These mechanisms do not constitute fire protection systems, therefore are not directly covered by this Criterion. These mechanisms include such things as:

- Process monitoring and interlocks (ex. high temperature monitoring of exothermic processes).
- Diking/drainage providing containment for stored liquids including flammable/combustible liquids.
- Fail-safe design of processes (ex. fail-safe settings including heat sources off, agitation systems running, cooling water valves open, ventilation operating).
- Combustion safeguards for fuel-fired equipment.
- Programmatic combustible loading.

When the above types of mechanisms are temporarily impaired or suspended, consideration should be given to taking compensatory actions until these mechanisms can be returned to operable status. There is no requirement to initiate an Impairment as described by this Criterion, but compensatory actions are strongly recommended. FWO-FIRE can provide guidance.

Appendix C
Fire Watch Requirements

1.0 Scope

This procedure contains the requirements for providing a fire watch in facilities where automatic fire suppression or alarm systems are installed but are out of service and the affected area is unattended.

2.0 Requirements

The Facility Manager shall ensure that the following requirements are accomplished:

1. Fire watch personnel understand the specific nature of the impairment and the specific area affected.
2. Fire watch personnel for fire system impairments shall rove all areas affected by the impairment.
3. Fire watch personnel have been instructed in the appropriate emergency actions, including the best method for sounding an alarm, manually activating a suppression system if in service, a method for notifying the Fire Department of an emergency, and the proper use of a portable fire extinguisher.
4. Fire watch personnel have been instructed in the proper frequency of tours. Frequency of tours shall be:
   a. Continuous when required by facility process standards or process controls.
   b. Hourly when automatic suppression systems are out of service.
   c. Once every 2 hours if only automatic alarm capability is out of service.
   d. As amended by the Fire Protection Group.
5. Fire watch personnel shall be informed of unusual conditions (i.e. presence of combustible liquids) and any safety related items that are applicable to accomplishing the fire watch tasks safely.
6. Fire watch personnel have received formal Fire Extinguisher Hands-On Training within the last 12 months.

3.0 Records

A record of fire watch tours shall be maintained for two years or longer as directed by the Facility Manager. The record shall note the following, at a minimum:

A. Name and organization of fire watch personnel.
B. Date and time of required fire watch.
C. Any unusual conditions observed.
D. Description of any event requiring emergency response.

4.0 References

A. NPFA 25

Appendix D
Fire Protection Impairments Process Flow Chart